

MATHEMATICS TEACHING PRACTICE 7:

Support productive struggle in learning mathematics

Effective teaching of mathematics consistently provides students, individually and collectively, with opportunities and supports to engage in productive struggle as they grapple with mathematical ideas and relationships.

Strategy and Process for Students with Disabilities	Digital Learning Experience
<p>Establishing norms for struggle</p> <ul style="list-style-type: none">• Have purposeful discussion about the role of struggle in learning. Important points might include:• Struggle is the point when the best learning can occur;<ul style="list-style-type: none">◦ Struggle causes the brain to grow new or stronger connections that will retain learning; and◦ Struggle supports people in learning how to think strategically and problem solve in all areas of life, including mathematics.• Then, as a group address the following questions and record on an anchor chart, a document or a math notebook for ongoing reference:<ul style="list-style-type: none">◦ What can you do if you struggle during math?◦ What questions might you ask yourself if you get stuck? (Metacognitive Questions)◦ What can you try before asking the teacher a question?• Remind students to use the expectations/strategies when they encounter struggle during learning.	<p>If you have developed a set of expectations based on the three questions in the process column for in-person traditional instruction, consider revising as a class for a digital setting. Some ideas for accomplishing this:</p> <ul style="list-style-type: none">• Include a digital "Help, I'm stuck!" button on a website or other virtual platform. The button should link students to an established list of strategies or questions that could help them get unstuck. This could be for any time (consistent) or for a specific task (customized).• Establish a method for requesting a thinking partner (teacher or adult) such as a Google Form with available times, a place to briefly describe how they are stuck and strategies they already have tried for getting unstuck.• Offer virtual small group thinking rooms for students who need a processing partner so they can effectively employ struggle strategies.
<p>Using catch and release</p> <ul style="list-style-type: none">• Launch the assigned task as planned (give directions, think time, work time, etc.).• Students work independently or in small groups.• Teacher monitors student thinking and specifically looks for a teachable moment where some students might encounter struggle.• At the same time, monitor for a student or group who has a strategy that might help others who are struggling or stuck.• Catch the group just in time. To catch students, ask everyone to pause working and join a brief whole group discussion.• Ask one or more students to share how they got started or what strategy they are using to approach the task without revealing too much about how to solve the task.• Release the group to continue thinking through the task.	<p>Catch and release can be used in synchronous digital experiences in a similar way as described in the process column. Use breakout and main room structures if needed.</p> <p>During asynchronous digital experiences, consider substituting the following in place of a true catch and release:</p> <ul style="list-style-type: none">• Having a digital "Help, I'm stuck!" button on a website or other virtual platform. The button should link students to examples of ways they might get started on a task or samples of other partially completed student work.• Explicitly inserting links within the digital lesson to catch students so they can examine ways of approaching the task at that point in the task. The link might also take them to questions that push their thinking or support them in getting unstuck if needed.

<p>Metacognitive questioning</p> <ul style="list-style-type: none"> • Model using metacognitive questions during think-alouds. • Give students access to these questions to help them develop the habit of thinking about their thinking in order to navigate struggle. <p>Metacognitive questions for productive struggle:</p> <ul style="list-style-type: none"> • What is something you know about the problem? • What tools might help you think about the problem? • Have I seen a problem like this before? Can that same strategy help me solve this problem? • Why am I stuck? (Pinpoint a particular hurdle.) • What strategies have you already tried? • How else might I represent my thinking? Could I build it, draw it or write it in a different way? • What question do I need answered so I can get unstuck? 	<p>For digital learning experiences, consider encouraging students to ask metacognitive questions by having a digital “Help, I’m stuck!” button on a website or other virtual platform that reminds them to ask themselves the questions.</p> <p>Another way to support students in learning how to use metacognitive questions is to video the teacher modeling a similar problem and asking metacognitive questions during the think aloud. Students should have access to view the video “just in time” if necessary to support them in overcoming a barrier during learning.</p>
<p>Planning time for struggle</p> <ul style="list-style-type: none"> • Take time to work the task from start to finish prior to introducing it to students. • Time yourself. • Then, consider the background knowledge and current skill set of your students and adjust the time accordingly. • Intentionally plan the points of time when you will do a check-in with the whole group, small groups or individuals. This might be a point in time (5 minutes into the work session) or a point in the task, which might be flexible based on the pace of the thinking. • Focus on the quality of the task and thinking instead of the quantity of tasks completed. 	<p>Time to struggle in a digital learning experience might need adjustment.</p> <ul style="list-style-type: none"> • If you are translating a task you have previously worked on with your students in the traditional in-person setting, take time to complete the task again using all the digital tools and strategies. • Adjust the time as needed. • Use a timer to alert students when you will be checking in so if they are struggling, they are prepared to persevere for that length of time. • If you are using breakout rooms for small group work, plan a system for checking in during your planned times.

Contact your special education regional cooperative for more information on using virtual tools and additional resources.

Reflection Questions

1. Where do I anticipate students with disabilities might get stuck in this learning experience?
2. How can I empower students with disabilities to access strategies and resources when they get stuck during the learning? Do they have support if I am not available immediately?
3. What recent or past experiences have my students had that are related to this learning that might be important to make connections to or build upon?
4. What questions might be helpful to pose, to probe, scaffold or challenge student thinking during the learning?
5. How might my students' Specially Designed Instruction prepare them for getting stuck during this learning experience?

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